Iowa State University Toxicology graduate student has unearthed some promising results in her quest to identify plant extracts to combat a devastating parasitic disease in Cameroon and other African countries. By Fred Love, ISU News Service.

Melanie Abongwa, a toxicology graduate assistant in biomedical sciences in the ISU College of Veterinary Medicine who grew up in Cameroon, hopes that her research could help to alleviate the suffering caused by onchocerciasis, a disease sometimes called river blindness caused by parasitic worms.

There’s no vaccine, nor is there an effective treatment to kill the adult worms that cause the disease. But Abongwa is studying a pair of plants native to Cameroon that rural residents have used to alleviate symptoms of the disease for years. Rural residents commonly turn to herbal remedies because of their limited access to modern medicine, but Abongwa said they have no scientific basis to claim how – or even if – the herbal treatments work. “They don’t know what kind of dose they’re taking, what in the plants is making them better or if the plants may be toxic in other ways,” Abongwa said. “Those were questions that needed to be answered.” She’s hoping that her research will fill in those gaps and potentially lead to new drugs to treat the disease.

Onchocerciasis can infect up to 90 percent of residents in some villages in rural Cameroon and other areas of sub-Saharan Africa, Abongwa said. The worms are transferred to humans through the bite of blackflies and migrate to the subcutaneous tissue underneath a host’s skin, where they mature and reproduce. The worms can cause a host to experience rashes and unbearable itching and even blindness. “The burden that this disease imposes on the villages can’t be overstated,” Abongwa said. “The responsibility of taking care of the blind usually falls on the shoulders of children, often girls. That means they have fewer opportunities to go to school or build their own future.”

Abongwa spent a week in a rural village in Cameroon called Bambui, where onchocerciasis has reached endemic levels. She learned that people with the disease were boiling in water two different plants – Daniellia oliveri, a legume; and Psorospermum febrifugum, a flower – and drinking the liquid like a tea twice a day or applying it directly to the skin to treat their symptoms. After having the plants identified by a botanist, she began breaking them down into basic extracts and then testing them at different doses to see if they had an effect on adult worms that had infected cattle and rodents.

Abongwa said of the 12 extracts she isolated, eight of them have shown promise as a means of combatting the worms. But, even if she can prove conclusively that the compounds can kill the worms, she also has to make sure the plants aren’t toxic to humans in other ways. So plenty of work remains before any of the extracts could be used to develop new drugs, she said. Abongwa works
with Richard Martin, a professor of biomedical sciences, and Alan Robertson, an associate professor of biomedical sciences. The ISU lab that Martin and Robertson oversee specializes in advancing new anti-parasitic drugs.

“She’s found some potent extracts,” Martin said. “The task now is to identify the chemicals that are bringing about the treatment.” In 1987, the pharmaceutical company Merck committed to donating the drug Mectizan, known generically as ivermectin, to treat river blindness in Africa, Latin America and the Middle East. However, Abongwa said some in Cameroon avoid Mectizan treatment because it sometimes results in additional itching as a side effect of killing off one of the two worm species that cause illness.

Abongwa hopes that the plant extracts she’s studying will kill the worms that cause river blindness without causing those harmful side effects, she said. Abongwa’s research is supported by the National Institutes of Health and the Schlumberger Foundation through its Faculty for the Future program, which awards fellowships to women from developing and emerging economies to pursue Ph. D. or post-doctoral research in science, technology, engineering and mathematics. Abongwa is also working with Fidelis Cho-Ngwa and Godfred Ayimele, who are faculty members at the University of Buea in Cameroon, where Abongwa completed her bachelor’s and master’s degrees in biochemistry.

Schlumberger Foundation

The Schlumberger Foundation has granted $6.3 million to 168 women scientists through its Faculty for the Future program for the 2014-2015 academic year. This program, now in its 10th year supports women scientists from developing countries through grants to enable them to pursue PhDs and Post doctorate studies. 405 women from 68 countries have received Fellowships since 2004. www.facultyforthefuture.net

STATUES OF CY

Thirty-one 6-foot Cy statues produced as part of the CyclONE City project are displayed around Ames. Take the tour: http://www.youtube.com/watch?v=ywIY2AQwly0&feature=youtu.be We put a few photos throughout the newsletter for you to enjoy. Each CY is creatively different.


TGSO (Toxicology Graduate Student Organization) organized this year’s Zaffarano Lecture. Dr. Gary Miller, Environmental Health, Emory College, GA presented “Pesticides, PCBs, and Parkinson’s disease: A Story of Storage.” Dr. Miller’s research has focused on environmental factors involved in the development of neurodegenerative conditions, such as Parkinson’s disease. The talk was co-sponsored by the Department of Biomedical Sciences and Interdepartmental Toxicology.

Dr. Anumantha Kanthasamy, Chair of Biomedical Sciences, presents the 2014 Daniel J. Zaffarano Lecture plaque to Dr. Gary Miller.

The plaque is awarded annually to an invited speaker in honor of Dr. Zaffarano, Dean of the Iowa State University Graduate College, 1971-1988, who was a strong proponent of interdisciplinary research in the 1980s.

“Today’s complex problems require interdisciplinary approaches.”

Dr. Zaffarano recognized the potential for Toxicology to address a growing number of challenges in our society and was very supportive of the formation of the Interdepartmental Toxicology program.
GRADUATIONS 2014

Kirsten Larson, MS, Toxicology (FSHN/Suzanne Hendrich). Type 4 resistant starch diminishes 
*Citrobacter rodentium* induced diarrhea in C3H mice.

Shanthi Ganesan, Ph.D., Toxicology (Animal Science/Aileen Keating). Ovotoxicant induced DNA damage and ovarian responses in rat ovaries.

James Delgado, Ph.D., Toxicology (Agronomy/Jeff Wolt).

Aaron Gross, Ph.D., Toxicology (Entomology/Coats). Botanical pesticides: Identification of a molecular target and mode of action studies.

NEWS FROM WOLT LAB

Jeff Wolt is serving on a committee convened by the National Academy of Sciences to conduct an independent scientific and technical evaluation of the California Department of Pesticides risk-assessment process for human health exposure and risk assessment.

Assiya Turganbayeva of the National Center for Biotechnology of Kazakhstan is spending the year in the Seed Science Center to undertake studies on genetically-engineered trait detection and its relationship to biosafety and biosecurity under the joint direction of Jeff Wolt and Trisha Scott of the Seed Laboratory. Dr. Turganbayeva is supported through a fellowship from the Kazakhstan Ministry of Education and Science.

Adam (AJ) Kenny, former graduate student in the Wolt Lab, has recently co-authored a publication analyzing plant-derived bioprocessing enzyme fate and effect in soil: Kenny AJ, Wolt JD. 2014, Persistence and ecological implications of maize-expressed transgenic endo-1,4-β-D-glucanase in agricultural soils, *Environmental Toxicology and Chemistry* DOI 10.1002/etc.2645.

ALUMNI UPDATE

Mathieu Renouf, Ph.D. (2005): Science Transfer Manager at Nestlé Research Center, Lausanne, Switzerland. Business - R&D interface for several business categories: managing a portfolio of business-aligned research activities and ensuring effective transfer of scientific concepts and knowledge to the business for product development.
TGSO and SCIENCE BOUND

TGSO was excited to host part of the Science Bound students’ visit to Iowa State this year. Science Bound is Iowa State University’s premier pre-college program to increase the number of ethnically diverse Iowa Students who pursue ASTEM (agricultural, scientific, technical, engineering and mathematics) degrees. While Science Bound students were on campus, TGSO hosted a group of about 10-15 students in the Insectary Building from 9:45-11:00am on Saturday, Nov. 1st. TGSO gave a brief powerpoint overview of the “Wonders of Toxicology” and about the potential jobs and research that are available after earning an advanced degree in Toxicology. They gave a short demonstration exposing house flies to various solutions at different concentrations to illustrate the relative toxicity of different compounds and some mosquito repellency solutions. Science Bound students received a brief tour of the rearing room (where they keep their insect colonies). TGSO members active in the event were Edmund Norris (Entomology/Coats), Jorrell Fredericks (VMPM/Wannemuehler), and Heliang Shi (BMS/Cho).

Feedback from the visit by the Science Bound office: The students really enjoyed the toxicology presentation—we heard many positive comments. The mentors and teachers who accompanied the group rated the activity a 9 on a scale of 1-10, with 10 being the highest rating. The only comment for possible improvement was to include information on careers. Having individuals such as you share your expertise with our students is critical. As you know, SCIENCE BOUND’s purpose is to increase the involvement of diverse young people in agriculture, science, technology, engineering and mathematics. Reaching this goal would not be possible without people like you who are willing to share your expertise and talent.

CSSOT

was held in Kansas City, Missouri, this year at MRIGlobal


Best Poster Award: Monica Langley (Anumantha Kanthasamy Lab/BMS). Non-Motor Symptoms in MitoPark mouse of Parkinson’s disease. Langley, Monica R, Ay, Muhammet; Ghaisas, Shivani1; Jin, Huajun; Anantharam, Vellareddy; Kanthasamy, Arthi; Kanthasamy, Anumantha

Best Poster Award: Jie Luo (Anumantha Kanthasamy Lab/BMS). Neurotoxic Insults Upregulate a Novel Secreted Protein to Promote Cell Survival in Dopaminergic Neuronal Cells During Early Stages of Toxicity. Luo, Jie; Kanthasamy, Arthi ; Neal, Matthew; Anantharam, Vellareddy ; Jin, Huajun; Kanthasamy, Anumantha.

<Many of the Cy photos were taken by John Hsieh, a BCB graduate student>
TOXICOLOGY RETREAT held October 24, 2014 at ISU Alumni Center

Douglas Allchin, Lecturer, History of Science, University of Minnesota Twin Cities; Fellow, Minnesota Center for the Philosophy of Science. "From Minamata to Modern Mischief: Ethics for the Practicing Toxicologist."

Steven Bradbury, Visiting Professor, Entomology, Iowa State University. Former: Director, Office of Pesticide Programs USEPA. "Human Health and Ecological Risk Assessments for Pesticides: Toxicology Challenges for the 21st Century"

Clair Crouyth, Ph.D., Principal Scientist, MRIGlobal. "Oh the Places You'll Go: How My Training as a Toxicologist Has Led to a Successful Career"

David Cwiertny, Associate Professor, Department of Civil and Environmental Engineering, University of Iowa. "Environmental Designer Drugs: When Micropollutant Transformation Does Not Eliminate Risk"

STUDENT TRAVEL TO NATIONAL CONFERENCES


Qi Xu (FSHN/Reddy Lab). Experimental Biology, April 27-31. “Hepcidin Plays a Key Role in 6-OHDA induced Iron Overload and Apoptotic Cell Death in a Cell Culture Model of Parkinson’s Disease.”

NEW TOXICOLOGY STUDENTS FOR 2014-2015

Toxicology recruited two new students for the 2014-2015 school year. One domestic student from Tuskegee University joined Aileen Keating’s lab in Animal Science. Wenda Zhu who completed his MS in Tox in 2010 returned and is seeking his Ph.D. degree with Jacek Koziel in ABE (Agricultural and Biosystems Engineering).